Missouri EPIDEMIOLOGIST

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General Guidance Regarding the Use of Antimicrobial Therapy

Gordon Christensen, M.D.
Harry S. Truman Memorial Veterans Hospital

How do you use antibiotics?

How do you go about deciding when to start, when to stop or when to change antibiotic therapy?

Textbooks and infectious disease experts have lots to say on the selection of antibiotics, but virtually nothing to say on the **use** of antibiotics.

The overusage of antibiotics includes:

- Using **too many** antibiotics
- Stopping therapy **too soon**
- Using therapy **too long**
- Changing antibiotic therapy **too often**
- Starting **too many** antibiotics

Common errors like these are due to common misunderstandings regarding the nature and purpose of antibiotic therapy (or more properly speaking **antimicrobial therapy**). The misunderstandings or fallacies are the result of using prescribing habits that work well with most other drugs but that do not work well with antibiotics. Why? Because antibiotics are not like other drugs. Before advising you on how to use antibiotics, we would like to begin by reviewing the distinctions between conventional drug therapy and antibiotic therapy. These distinctions are the origin of the five common fallacies of antimicrobial therapy.

The Missouri Department of Health believes the overusage of antibiotics is the primary problem leading to the development and spread of antimicrobial resistance. Antimicrobial resistance is the one thing that threatens to end the effectiveness of these lifesaving drugs. As many readers know, in recent years antimicrobial resistance has lead to cases of untreatable tuberculosis and enterococcal infections.

The information in this article was developed at the University of Missouri–Columbia as an educational guide for physicians and students. Because so many people have found it valuable, the department has decided to offer these guidelines as a structured format for the use of antibiotics. Our intention is that these guidelines should improve the use of antibiotics, particularly in long-term-care facilities and hospitals. This improvement should help limit the spread of antimicrobial resistance. These guidelines are simply guidelines; they are not hard and fast rules and they should not be construed as the official policy or opinion of the Department of Health or the University of Missouri.

The Five Fallacies of Antimicrobial Therapy

Fallacy #1: Antibiotics are supposed to kill "bugs," aren't they?

Actually, with the exception of certain conditions, the purpose of antimicrobial therapy is to slow the spread of infection so that the host defenses can fight off the infection. Most antibiotics are "bacte-

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riostatic" drugs—meaning the drugs inhibit the growth of bacteria but do not kill the bacteria. Nevertheless, in most situations these drugs are highly efficacious. The importance of this concept is the recognition that the therapeutic action of antibiotics is indirect; patient recovery depends first upon host defenses. Antibiotic therapy simply limits the progress of the infection so that the host defenses can gain the upper hand.

The indirect effect of antibiotics is unlike the direct effect of most other drugs. For this reason, many of the therapeutic approaches that work well with direct acting drugs do not apply to antimicrobial agents.

The conditions which require antimicrobial agents to kill bacteria (bactericidal therapy) are endocarditis, meningitis and sepsis in the neutropenic patient. In addition, many clinicians also use bactericidal therapy for treatment of osteomyelitis and undrained abscesses.

Fallacy #2: If a little bit of antibiotic therapy is good, a lot must be better!

While this approach may be highly appropriate for managing blood glucose with insulin or blood pressure with a calcium channel blocker, it does not work with antibiotics. Dose-response curves do not apply to antimicrobial therapy; antimicrobial therapy is either sufficient or insufficient. Enough therapy has to be given to allow clearance of the infection, too little is not enough and too much is excessive. Handbooks, textbooks and the package insert (or *Physicians Desk Reference*) provide guidelines on the appropriate amount of drug therapy.

Fallacy #3: I really don't need to give a full course of antimicrobial therapy.

Most of my patients get better with less than the recommended therapy. This is a common and absolutely correct observation. The problem is when we extend this observation to make the incorrect assumption that you don't really need to give a full course of antimicrobial therapy.

If you have a hundred patients with pneumonia, how many deaths would you consider acceptable? Five? One? None? Most drug regimens are designed to cure 95–99 percent of patients treated; in order to cure nearly all patients we end up over-treating most patients (usually those patients with the strongest host defenses) who would respond to less than the full course of therapy. This over-treatment accounts for the valid clinical observation stated above. Since drug regimens are purposefully designed to include those few patients (usually the sickest and weakest) who require maximal therapy, the problem for the clinician is to accurately predict which patients need maximal therapy and which patients can get by with less. Unfortunately, with a few exceptions, this cannot be reliably predicted. Many seemingly cured patients will relapse if their therapy is cut prematurely short, resulting in additional cycles of antibiotic therapy, inadequately treated infections, clinical confusion and predisposition to the emergence of antimicrobial resistance. For this reason, it is best to give a full course of therapy whenever therapy is instituted.

Fallacy #4: I have started antimicrobial therapy, but the patient has not improved. Shouldn't I change therapy?

Remember, antibiotics act indirectly; in most situations it is the host defenses that are responsible for recovery. Since the host determines the clinical response, by convention[1], we wait at least 72 hours before concluding that the antimicrobial therapy is ineffective. Normally, in the absence of a definitive diagnosis or significant toxicity, you should not change therapy unless it is to add therapy for an important therapeutic omission.

Fallacy #5: My partner (or the infectious diseases consultant, internal medicine consultant, textbook, etc.) says the therapy I started is not the "treatment of choice." Shouldn't I change therapy?

This is a common problem in the medical school setting where we emphasize precision in the selection of antibiotics. The proper question in this circumstance is not whether the chosen therapy is the "treatment of choice" but whether the chosen therapy will be effective against the anticipated infecting microorganisms. If the therapy is appropriate, then it should not be changed. The reason for this is that with appropriate dosing it takes at least four doses of antibiotics to develop the desired blood level and proper blood levels are required before the therapy can be effective. Switching antimicrobial therapy before the desired blood level is achieved only delays the administration of effective therapy. This delay could be crucial in severe infections and could also predispose to the development of resistance.

Remember: *Consistency is better than elegancy and the treatment of choice is treatment.*

After the patient has been stabilized and the infecting microorganisms identified, you should re-evaluate your therapy to decide if it is the best therapy for the patient's infection. The best therapy is the antibiotic with the narrowest spectrum, the least toxicity and the lowest cost.

General Approach to Antibiotic Therapy

The first step in using antibiotics is to record the diagnosis. It seems obvious—but it is often overlooked—that therapy must follow diagnosis. Without a diagnosis, how can we hope to provide the correct therapy? Perhaps because the diagnosis appears too obvious or too elusive, we often forget to write down the diagnosis. The result, however, is

often clinical confusion and the overuse of antibiotics. The diagnosis does not have to be sophisticated, it doesn't even have to be correct, but it is necessary because the entire management of the patient rests on this one point. With a diagnosis, we know how to evaluate a patient, how to choose an antibiotic and what to do if the patient gets better or fails to improve.

Simply stated: *Antibiotic therapy follows diagnosis. Antibiotic therapy should only be used when the patient has a diagnosis of infection. If a patient does not have a diagnosis of infection, antibiotic therapy should not be used.*

The diagnosis of infection actually has two parts or components. These components are important because they guide us in the management of the patient and the selection of the antibiotic. The first component is the organ system involved or the **syndromic diagnosis**. The second component is the most likely infecting pathogen(s) or the **etiologic diagnosis**.

The syndromic diagnosis guides the physician in evaluating the patient. Just saying "pneumonia," "sepsis" or "urinary tract infection (UTI)" brings to mind a series of pathogens for each infectious process. If a physician is uncertain as to the potential pathogens for any given syndromic diagnosis, a variety of textbooks and handbooks can be consulted to clarify the issue. The most likely pathogens for a given infection dictate the choice of antibiotics; all that is left for the physician is to select from the list of effective agents that agent which is the most appropriate for the patient in terms of hypersensitivity, penetration, toxicity, pharmacology and cost.

So that the diagnostic and therapeutic plan can be followed, the order for an antibiotic should always be accompanied by a statement in the progress notes or order sheets that specifies the syndromic and etiologic diagnosis. The diagnosis does not have to be detailed—it may be as simple as "suspect gram-negative nosocomial pneumonia"—but the presence of such a statement is of inestimable value in plotting the medical management of the patient.

When recording the syndromic and etiologic diagnosis, a good habit to follow is to also record the specific signs or symptoms which prompted the diagnosis. In the words of Dr. Meador:[2]

"Know which abnormality you are going to follow during treatment. Pick something you can measure. If there is no abnormality to follow, do not treat with drugs..."

Deciding what abnormality you are going to follow resolves another perplexing and confusing problem inherent in antimicrobial therapy. Simply stated, the problem is as follows: When is it easiest to diagnose an infection like pneumonia? When the patient has a mild nonproductive cough and minimal fever, or when the patient is hypoxic, hypotensive, febrile, producing purulent sputum and has chest pain? Obviously, it would be the latter, but when is it easiest to treat pneumonia? Just as obviously, it would be when the patient has minimal symptoms and signs. This is the diagnostic paradox of empiric antimicrobial therapy. The optimal time for treatment of infection is at its earliest presentation, when the patient is healthiest and the infection is minimal. This is also the time when the infection is most difficult to recognize, when the clinical presentation is the most subtle and the laboratory findings are most likely to be falsely negative. Therefore, superb clinical medicine requires physicians to make the diagnosis of infection when the diagnosis is most difficult to make. Under these circumstances, physicians are likely to forget the subtle signs and symptoms that prompted empiric therapy unless they make an effort to document these findings. Nevertheless, under these same conditions, the patient is most likely to respond to therapy. For these reasons, the following course of events often takes place:

A patient is started on antimicrobial therapy for distinct, but minimal, signs and symptoms. The patient quickly improves, but the physician forgets the patient's presentation that prompted therapy. Faced with a seemingly healthy patient under therapy for an uncertain diagnosis, the physician stops therapy. For many of these patients, the short course of therapy is sufficient and the patient goes on to recovery, but for many other patients the short course of therapy is inadequate, and—to the confusion of the physician—the patient relapses. Recording the signs and symptoms that prompted the diagnosis and therapy helps the physician remember why therapy was started, and it also enables the physician to assess whether the patient has improved, as well as to determine the management of the patient's antimicrobial therapy.

Types of Antimicrobial Therapy

Antimicrobial therapy falls into three categories, each of which requires a somewhat different approach by the physician.

Prophylactic Therapy

The purpose of this therapy is to prevent infections from occurring by treating the exposed patient. Proper treatment requires the physician to make an assessment of risk. In most cases, clinical studies have already determined that certain patients under certain conditions have significant risk and should receive a specific course of antibiotic therapy—for example, patients with significant exposure to *Neisseria meningitidis* or patients facing a hysterectomy. These guidelines are available in handbooks and manuals. In selected situations for which there are no guidelines, physicians may have to use their own judgment in deciding that a patient is at risk because of a recent or anticipated exposure to infecting agents. In these latter cases, the physician should specify the risk and the anticipated (or known) infecting organisms.

With few exceptions, such as *Mycobacterium tuberculosis*, prophylactic anti-

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microbial therapy is only effective if given for a short period of time. With prolonged therapy, the patient becomes colonized with microorganisms that are resistant to the prophylactic agent (and perhaps to other agents); such colonized patients may develop infections that are difficult to treat or may serve as a reservoir for the contamination and infection of other patients and personnel. For these reasons, prophylactic therapy should be limited to 48 hours or less.

Definitive Therapy

Patients whose infecting microorganism has been identified should receive definitive therapy. This therapy should be "narrow spectrum," which means that as far as possible the antimicrobial agent should be inactive against other microorganisms. The value of narrow spectrum therapy is that it has limited impact on other microorganisms, minimizing both the emergence of antimicrobial resistance and the disturbance to the patient's microflora. Firm guidelines for the choice, dose, duration and route of antimicrobial therapy are usually available in handbooks, manuals and textbooks.

Empiric Therapy

The decision to start empiric antimicrobial therapy is based upon an assessment of "risk." The patient may be at risk because of a severe infection (like pneumonia or sepsis) or because of compromised host defenses (like asplenia or neutropenia). Since the infecting organism is unknown, the choice of antibiotic therapy in empiric therapy requires the physician to anticipate the infecting microorganism. For this reason, empiric therapy is usually "broad spectrum" therapy. Unfortunately, no matter how broadly designed, no single antimicrobial agent or combination of agents can effectively cover all the infectious possibilities. Therefore, antimicrobial therapy has to be directed toward specific microorganisms. This is done in the following manner (in order of importance):

- Results of gram stains and other rapid diagnostic smears and assays;
- Prior culture data (when available);
- Epidemiologic data or clinical setting (the who, when and where of illness); and
- Codified clinical experience (available in handbooks, manuals and textbooks).

Empiric therapy is a clinical trial in which the physician makes a clinical diagnosis and treats the patient based upon the diagnosis. The response of the patient (getting better or getting worse) determines the course of the trial. In conducting this trial, the physician should allow at least 72 hours[1] (longer in compromised patients) before concluding that the antimicrobial therapy is ineffective.

The astute physician will recognize that the preceding could involve the logical error known as "*post hoc ergo propter hoc*."[3] This error is the assumption of a causal association between an event and a preceding action; specifically, the patient's condition after antimicrobial therapy. In fact, the recommendations are based upon the recognition that the patient's apparent "response" to therapy is not proof of the nature of his/her illness; nevertheless, this "response" can serve as a guide to management. The ensuing comments describe the rationale of this approach.

Following microbial therapy, the patient will either improve, decline or have an indeterminate response.

1. If the patient improves, it may be because the diagnosis was correct and the patient was correctly treated, or because the diagnosis was incorrect but the patient spontaneously recovered. Whether the clinical diagnosis was correct or incorrect in this situation is not pertinent to the patient's continuing care because the patient has recovered. The physician should simply recognize that the diagnosis was a presumptive diagnosis and could be in error. On the other hand, given the clinical circumstances, there is a high probability that the diagnosis was actually correct and the patient was responsive to therapy. Because physicians are uncertain of the clinical diagnosis, they often waver in their commitment to continuing therapy. Under these circumstances, it would be wrong to deprive the patient of a potentially successful course of therapy simply because the physician is uncertain of the diagnosis. *Bad diagnosis does not equal bad therapy.*

2. If the patient fails to improve, it may be because the diagnosis was correct but there was a problem in the management of the patient, or because the diagnosis was incorrect in the first place. Recommendations for the management of both possibilities were given above.

3. Finally, the physician may not be able to decide whether the patient has improved or declined on antimicrobial therapy. For these circumstances, recommendations are given for daily reassessment and—if the indeterminate response continues—an end-point to therapy is suggested.

The goal of the physician during a course of empiric therapy should be to confirm the clinical diagnosis by cultural isolation of the infecting organism(s) and to, thereby, convert empiric therapy into definitive therapy. If the patient improves on therapy, but an etiologic diagnosis cannot be made, then the patient should still receive a full course of therapy as indicated by the clinical diagnosis.

Remember: *A poor diagnosis does not deserve poor therapy!*

If, during a successful course of empiric therapy, the patient develops a reaction to the antimicrobial agent, then the agent should be stopped and a new agent substituted which will be effective against the suspected pathogens. The new agent should then be used until the completion of the planned therapy. If at any time an alternative diagnosis is made to explain the patient's presentation, then empiric therapy should be stopped. If, after 72 hours of therapy, the patient has failed to improve, then the physician should conduct a comprehensive re-evaluation. In

re-evaluating the patient, the physician should consider the following:

- Failure of therapy may be due to a complication such as: persistence of infection due to obstruction of drainage, abscess formation or foreign body; superinfection; alteration in the host micro-ecology (like pseudomembranous colitis); secondary (nosocomial) infection; or drug fever.[4]
- Failure of therapy may be due to therapeutic malfunction such as: a lapse in administration of the antimicrobial agent, the wrong dose of the antimicrobial agent, the wrong interval of antimicrobial therapy, the wrong route of antimicrobial therapy, poor penetration of the antimicrobial agent to the site of infection, genotypic resistance, or drug incompatibility or antagonism.[4]

If failure is not due to a complication or therapeutic malfunction, then the physician should consider the following possibility:

- Failure of therapy may be due to diagnostic error, such as the wrong diagnosis of infection or the emergence of concomitant disease.

In this case, the appropriate response is to stop the empiric therapy, re-evaluate the patient and start a new course of empiric therapy if indicated.

In some patients, the physician may not be able to decide whether the patient has truly improved or failed to improve. The physician may also believe that in these patients the risk of stopping antimicrobial therapy is greater than the risk of continuing therapy. In such instances, it is reasonable to continue therapy on a day-by-day basis, re-evaluating the patient in a comprehensive manner every day. If, after a full course of therapy, the patient's response is still uncertain, then—with one exception—the therapy should be stopped. The exception is that for drug-induced neutropenic patients, therapy should be continued until the patient has recovered from the neutropenia.

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Bureau of Environmental Epidemiology Emergency Response Involvement—Nuclear Power Plants

Gary McNutt
Bureau of Environmental Epidemiology

There are two nuclear power plants that could impact Missouri in the event of an incident resulting in radioactive releases to the environment. Callaway Nuclear Power Plant is located in Callaway County about 20 miles from Jefferson City. It is owned and operated by Union Electric Company. Cooper Nuclear Power Station is located at Brownsville, Nebraska, on the banks of the Missouri River directly across from Atchison County. Cooper is owned and operated by the State of Nebraska.

Because of the many safety features associated with their construction and operation, the probability of an incident involving the environs outside the exclusion area of a nuclear facility is extremely low. However, the possibility does exist and there is a need for contingency planning to insure that existing capabilities are effectively used to minimize the effects if such an incident should occur. Specifically, there is a need for planning to protect the public from the effects of radioactive gases, vapors or particles vented into the atmosphere, or radioactive liquids discharged into the waterways as a result of incidents occurring at the nuclear facility.

Emergency preparedness and planning is related to two Emergency Planning Zones (EPZ's) with related radiation exposure pathways. EPZ's are defined as areas for which planning is needed to assure that prompt and effective actions can be taken to protect the public in the event of an accident. The first EPZ is the Plume Exposure Pathway. This is an area of about ten miles radius of the facility with the principal exposure being whole body external radiation exposure from the radioactive release (plume) and from deposited material and inhalation exposure from the passing radioactive plume. The second EPZ is the Ingestion Exposure Pathway. This is an area of about 50 miles radius of the facility with the principal exposure from ingestion of contaminated water or foods such as milk, fresh vegetables or aquatic foodstuffs.

It is the responsibility of the Department of Health, Bureau of Environmental Epidemiology, to direct operations specifically related to nuclear radiation affecting the environs outside the bounds of the nuclear facility. This responsibility includes nuclear radiation monitoring, determination of need of implementing protective actions, advising other agencies regarding actions that should be taken, determination of individual exposure levels and determination of the need for decontamination. It

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Hepatitis A in Food Establishments

David Stull, R.S.
Bureau of Community Environmental Health

Caryl Collier, R.N., M.P.H., C.I.C.
Bureau of Communicable Disease Control

"Your salad preparer has been diagnosed with hepatitis A!" These words can strike fear in the heart of any restaurant owner, and with justified cause. Such an announcement can mean illness to customers, the potential for legal action against the restaurant, poor public relations and the eventual demise of the business. For these reasons and the press coverage that may ensue, health professionals and the public may arrive at misconceptions about the proportion of hepatitis A cases traceable to an infected foodhandler employed in a food service establishment. This article is an attempt to clarify what is known about hepatitis A cases in foodhandlers and public health efforts to prevent secondary cases.

From January–December 1995, preliminary Missouri data indicate hepatitis A cases increased by 104.2 percent over the same period in 1994 (1,264 vs. 619 cases). Whereas 33 of the 619 cases in 1994 were either employed as foodhandlers or in food manufacturing, 62 of the 1,264 cases in 1995 were employed as such. Although no 1995 cases have been traced to an infected foodhandler, national surveillance data indicate that five to seven percent of reported cases are related to recognized food or water outbreaks. This percentage is relatively small when examining other sources of exposure; however, it is important as approximately 40 percent of cases cannot identify the true source of their exposure to hepatitis A.

The cost of preventing transmission of hepatitis A from an infected foodhandler to the public includes, among other major expenses, the cost of providing immune globulin (IG) to persons within 14 days of exposure. This cost of IG varies considerably with each foodborne exposure, but ranges from approximately $654 to $8,031. This is calculated using $7.77 per person ($3.27 per dose of IG and $4.50 for administration). Since 1987, nine occasions met the criteria established by the Centers for Disease Control and Prevention to make a public announcement that exposure may have occurred at a specific restaurant during a specific time period. Considering the number of restaurant investigations conducted that were related to hepatitis A-infected foodhandlers, the need for public announcements is uncommon because of delayed case reporting, being too late for IG administration and not meeting the given criteria. Nevertheless, the cost of giving IG to co-workers of infected foodhandlers, which is routinely done in all cases, amounts to many dollars if one calculates 10–20 co-workers per infected foodhandler. For 1995, the cost to Missourians is estimated to have been $4,817 to $9,548 ($7.70 per dose x 62 cases x 10–20 co-workers).

Why is hepatitis A such a problem for restaurants and other food handling businesses when there are other exposures to hepatitis A? We know that the virus does not exclusively reside in a certain population of persons called foodhandlers; there are other groups affected as well. In fact, there is some evidence that suggests the virus is readily transmitted among preschoolers and that child-care centers can serve as a major hepatitis A reservoir to the rest of the community by person-to-person transmission. However, when a hepatitis A case is identified in a commercial foodhandler, there is considerable expenditure of public health effort focused on preventing a common source outbreak because of the potential for widespread transmission within the entire community.

Foods usually involved in these common source outbreaks are foods handled by an infected worker and not receiving further heat treatment after handling. This makes salads, raw vegetables and sandwiches with raw garnishes particularly suspect as vectors of the virus, and they are often the involved foods in an outbreak.

Although a foodhandler is infected and can be infectious for a period up to two weeks prior to and two weeks following onset of symptoms, it does not mean that a common source outbreak will automatically occur. Since the virus is only shed in the feces, it takes the violation of several controls to bring the food into contact with fecal material. Foodhandlers who do not practice good hygiene and who do not properly wash their hands after eliminating body wastes are the ones who thwart the efforts of the establishment and the health department in serving safe food to customers. In spite of health department requirements to: 1) limit food handling; 2) protect food from contamination; 3) store food at temperatures that inhibit bacterial growth; and 4) provide handwashing sinks with soap and disposable towels in restrooms and food processing areas, the virus can still contaminate the food by neglecting to wash hands.

Just how to change this process that endangers both people and businesses continues to be debated in public health circles today. There is discussion of the mandated use of single-service plastic gloves, prohibition of bare-hand contact with ready-to-eat foods, double handwashing with the use of a nail brush, and required vaccination of foodhandlers with the newly developed hepatitis A vaccine (Havrix). Although any of these proposed interventions could be effective in eliminating the spread of hepatitis A in foodhandling establishments, the present requirements mentioned above are highly effective when they are followed by the foodhandler.

The key to any successful intervention is education and motivation, and this requires a concerted and cooperative effort between the food industry and the food safety regulators. Without such an effort, we will continue to investigate potential foodborne exposures to hepatitis A virus in an effort to prevent the common source outbreaks that could occur.

Missouri Department of Health
Division of Environmental Health and Epidemiology
BIMONTHLY MORBIDITY REPORT

Reporting Period *
September - October, 1995

	Districts							KANSAS CITY	ST. LOUIS CITY	ST. LOUIS CO.	SPGFLD GREENE CO.	2 MONTH STATE TOTALS		CUMULATIVE		
	** NW	NE	CD	SE	** SW	** ED	*** OTHER					1995	1994	FOR 1995	FOR 1994	5 YR MEDIAN
Vaccine Preventable Dis.																
Chickenpox	60	48	18	48	43	0		0	0	0	0	217	421	6495	8514	8158
Diphtheria	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Hib Meningitis	0	0	0	0	0	0		0	0	0	0	0	0	7	4	14
Hib Other Invasive	1	1	0	0	0	0		0	0	2	0	4	4	14	38	38
Influenza	0	0	0	0	0	0		0	0	0	0	0	0	302	163	163
Measles	0	0	0	0	0	0		0	0	0	0	0	0	1	160	1
Mumps	1	0	0	0	0	0		1	0	0	0	2	7	23	38	35
Pertussis	3	0	2	1	3	1		1	0	2	0	13	10	45	39	97
Polio	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0		0	0	0	0	0	0	0	2	1
Tetanus	0	0	0	0	0	0		0	0	0	0	0	1	1	1	0
Viral Hepatitis																
A	84	4	19	2	18	2		27	10	6	3	175	165	1132	523	550
B	14	1	1	0	4	0		4	6	2	2	34	85	339	418	418
Non A - Non B	3	0	1	0	0	2		0	3	7	0	16	4	65	19	28
Unspecified	0	0	0	0	0	0		0	0	0	0	0	0	0	0	9
Meningitis																
Aseptic	12	0	5	8	11	3		3	2	15	6	65	41	234	149	233
Meningococcal	0	0	1	0	2	1		0	0	3	0	7	4	52	40	32
Enteric Infections																
Campylobacter	6	3	22	7	15	8		4	3	13	3	84	103	500	550	535
Salmonella	10	3	18	29	13	13		10	9	19	1	125	130	448	536	466
Shigella	57	0	16	15	2	27		3	2	33	3	158	84	810	401	401
Typhoid Fever	0	0	0	0	0	0		0	0	1	0	1	0	1	1	2
Parasitic Infections																
Amebiasis	0	0	0	0	0	0		0	0	0	0	0	5	11	30	23
Giardiasis	28	8	28	8	14	24		16	15	35	12	188	196	543	609	625
Sexually Transmitted Dis.																
AIDS	11	3	9	8	1	7	7	42	41	20	11	160	120	639	621	567
Gonorrhea	62	13	75	56	44	14		560	578	332		1734	2060	9469	10325	12433
Genital Herpes	25	13	56	33	55	20		84	71	154		511	501	2961	2928	2928
Nongonoc. urethritis	25	8	9	14	4	8		256	434	454	5	1217	1014	7055	5099	5876
Prim. & Sec. syphilis	0	0	0	4	0	1		0	41	18		64	115	523	837	837
Tuberculosis																
Extrapulmonary	1	0	0	1	0	0	0	0	0	2	1	5	9	37	34	34
Pulmonary	1	1	0	2	3	1	0	7	4	3	3	25	38	153	173	173
Zoonotic																
Animal Bites	177	44	58	117	128	10		1	2	405	30	972	501	5802	3866	4716
Psittacosis	0	0	0	0	0	0		0	0	0	0	0	0	0	4	1
Rabies (Animal)	0	0	0	2	1	0		0	0	0	0	3	6	22	20	27
Rocky Mtn. Sp. Fever	2	0	0	0	1	0		0	0	0	1	4	5	23	16	24
Tularemia	0	0	0	0	4	0		0	0	1	0	5	7	24	22	29

Low Frequency Diseases

Anthrax
Botulism
Brucellosis
Chancroid
Cholera
Cryptosporidiosis - 10
Encephalitis (infectious)
Encephalitis (viral/arbo-viral)
Granuloma Inguinale
Kawasaki Disease - 2
Legionellosis - 2
Leptospirosis
Lymphogranuloma Venereum
Malaria - 2
Plague
Rabies (human)
Reye's Syndrome
Rheumatic fever, acute
Toxic Shock Syndrome - 2
Trichinosis

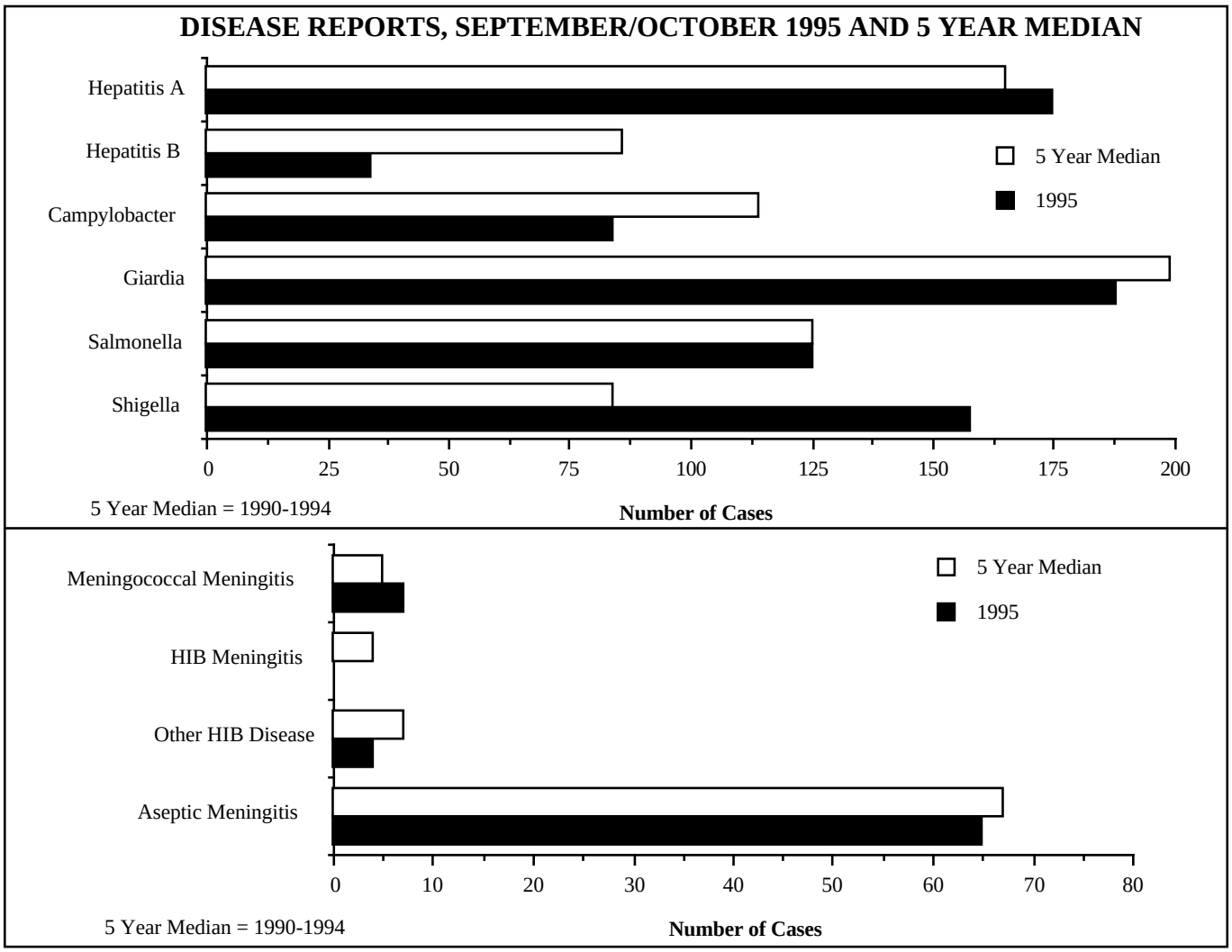
Outbreaks

Foodborne - 3
Nosocomial - 4
Pediculosis - 1
Scabies - 4
Other
Giardia - 1
Shigella - 1
Salmonella - 1
Diarrhea - 1
Pneumonia - 1

*Reporting Period Beginning September 3, Ending October 28, 1995.
**Totals do not include KC, SLC, SLCo, or Springfield
***State and Federal Institutions

Due to data editing, totals may change.

TEAR OUT FOR FUTURE REFERENCE



VIRAL HEPATITIS

The September/October 1995 bimonthly period showed an increase of 6.1%, from 165 cases of hepatitis A during September/October 1994 to 175 cases during September/October 1995. The five year bimonthly median for hepatitis A is 165 cases. Hepatitis B cases fell by 60.0% for the bimonthly period, from 85 in 1994 to 34 in 1995. Hepatitis B is 60.5% below the five year bimonthly median for September/October of 86 cases.

ENTERICS

Campylobacter decreased by 18.4% during the time period, from 103 cases in 1994 to 84 cases in 1995. It fell 26.3% from the five year median of 114 cases. Salmonella, at 125 cases, has fallen by 3.8% from 130 cases in 1994. The five year median is 125 cases. Shigellosis increased by 88.1% from 84 cases in 1994 to 158 cases in 1995. The five year median is also 84 cases.

PARASITES

Giardiasis fell by 4.1% from 196 cases during the 1994 bimonthly period to 188 in 1995. It fell by 5.5% from the five year median of 199 cases.

MENINGITIS

Aseptic meningitis increased by 58.5% from 41 cases in 1994 to 65 cases in the 1995 bimonthly time period. It fell by 3.0% from the five year median of 67 cases. Meningococcal meningitis rose by 75.0% from 4 cases in 1994 to 7 cases in 1995. A rise of 40.0% from the five year median of 5 cases.

HIB DISEASE

No cases of Hib meningitis were reported for the period in 1995 and none in 1994. It is a decrease of 100% from the five year median of 4 cases. Other invasive Hib disease had no change from 4 cases in 1994 and 1995. Other invasive Hib disease was made reportable in 1990 and there is now a September/October bimonthly five year median for other invasive Hib disease. Other invasive Hib disease fell by 42.9% from the bimonthly five year median of 7 cases.

Polio Immunization Recommendations

On October 18, 1995, the United States Department of Health and Human Services Advisory Committee on Immunization Practices (ACIP) met to develop a new strategy for the prevention of poliomyelitis in the United States. While the strategy is being reexamined, **the current recommendations for polio immunization remain in place**.

Changes in the current strategy for polio immunizations are being examined because of the near eradication of polio in the Western Hemisphere and because of the occurrence of vaccine-associated paralysis. However, polio immunization must continue until the disease is eradicated from the globe. The threat of international importation of the polio virus remains real. In order to continue to provide protection in the event of international importation, the ACIP has made a preliminary recommendation to examine a combined schedule of inactivated polio vaccine (IPV) and oral polio vaccine (OPV).

It is important to note that the final preferred schedule and recommended number of doses to be administered has not been finalized. In addition, the manufacturer of IPV will need time to produce the vaccine in sufficient quantities to support its increased use.

The Missouri Department of Health continues to support the current ACIP schedule for polio protection. The ACIP recommends an initial three doses of OPV (unless conditions calling for IPV are identified) at 2 months, 4 months and 6 months of age. An additional booster dose should be administered after the fourth birthday.

IPV and OPV are both effective in preventing poliomyelitis. However, when the benefits and risks for the entire population are considered, OPV is the vaccine of choice for primary immunization of children in the United States. OPV is preferred because it produces intestinal immunity, is simple to administer, results in immunization of some contacts of vaccinated persons and has a record of having essentially eliminated disease associated with wild polioviruses in the Western Hemisphere.

The current recommendation is that e-IPV be used when there are adults who have not been previously immunized, children with immunodeficiencies or household contacts with immunodeficiencies. This vaccine, administered as an injection, provides protection, but does not produce as much local immunity in the intestines where polio incubates. Parents should be made aware of the different vaccines available and the reasons why they are preferred. The benefits and risks of the vaccine for individuals and the community should be stated so that the immunization is carried out among persons who are fully informed.

If you have any questions regarding polio vaccination, or immunizations in general, please contact your immunization representative located in each of the Department of Health district offices or the Bureau of Immunization at (800) 219-3224.

National Infant Immunization Week
April 21–27, 1996

National Infant Immunization Week (NIIW) provides an opportunity to highlight and enhance the impact of existing immunization efforts. NIIW activities can help increase awareness of age-appropriate immunizations, enhance existing partnerships and attract new partners who can participate in long-term education efforts.

Numerous activities are being planned in various parts of the state to promote NIIW. The Child Immunization Coalition of St. Louis is sponsoring a Spring Immunization Conference on Wednesday, April 24, from 12:00 p.m. to 3:00 p.m. at the Junior League of St. Louis. The Centers for Disease Control and Prevention (CDC) will provide the keynote speaker. Continuing education credit will be requested.

For more information, contact your immunization representative located in each of the Department of Health district offices or the Bureau of Immunization at

(800) 219-3224

Hypothermia Mortality in Missouri 1985–95

H. Denny Donnell, Jr., M.D., M.P.H.
Office of Epidemiology

Bitterly cold weather is a significant hazard to life in our nation and in Missouri. The Centers for Disease Control and Prevention report that in the United States about 780 persons die each year from cold exposure and about half of these are age 65 and over. Unfortunately, this also occurs in Missouri where we have averaged 13 deaths per year from hypothermia during the past ten winters, of which 46 percent have been elderly persons. See Figures 1 and 2. This emphasizes a need to be very supportive of persons at highest risk, and especially so with increasing age.

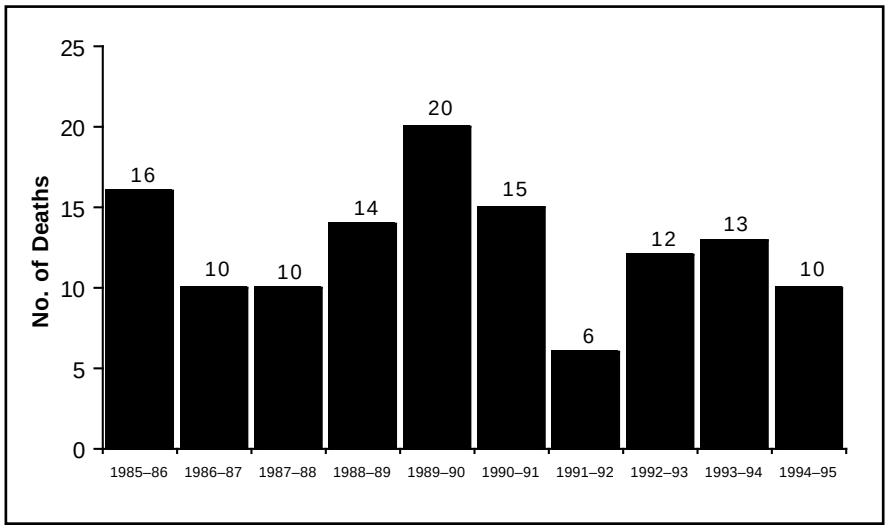


Figure 1. Hypothermia deaths, Missouri, 1985-86 to 1994-95.

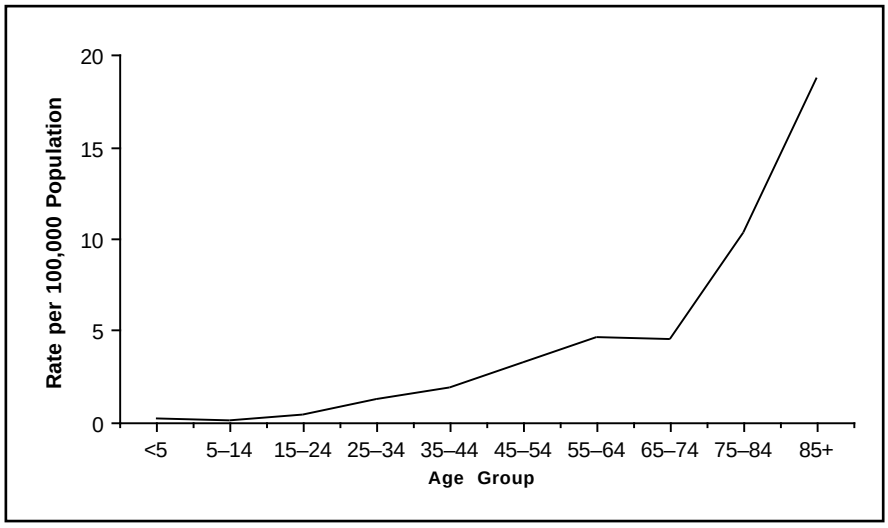


Figure 2. Hypothermia death rates per 100,000 population by age group, Missouri, 1985-86 to 1994-95.

Hypothermia occurs when the body temperature falls below 95˚F or 35˚C. Early and mild symptoms include shivering, slurred speech, mental slowness and lethargy, muscular stiffness and clumsiness. Symptoms of severe hypothermia include mental confusion, disorientation, stupor or coma, absence of shivering, stiff or rigid muscles, shallow and very slow breathing, weak pulse and fall in blood pressure. If symptoms of hypothermia are detected, immediate medical attention is warranted.

The elderly, who are often homebound and bedfast, are particularly vulnerable to hypothermia due to having less fatty tissue insulation, impaired shivering mechanism, lower metabolic rates, chronic illnesses, limited mobility and less perception of the cold. They may also be trying to reduce expenditures on heating and may gradually get so cold that their body temperature falls below a critical level, and even at temperatures well above the freezing mark, they quietly die.

The very young are also highly vulnerable to hypothermia, but society protects them well (babies should have sleeping rooms maintained at temperatures that feel comfortable to you and should have multiple layers of clothing and blankets that do no restrict the baby's breathing or movement).

The homeless and disadvantaged are at greater risk for hypothermia. Other risk factors associated with injury and death from the cold include alcohol use, certain illnesses and some medications that affect the nervous and vascular systems.

Illnesses that may adversely affect a person's response to cold temperatures include:

- Hypothyroidism and other disorders of the body's hormone system.
- Stroke and other disorders that cause paralysis or reduce awareness.
- Severe arthritis, Parkinson’s disease and other illnesses that limit activity.
- Any condition that reduces the normal flow of blood.
- Memory disorders.

Medications reported to contribute to core temperature depressions include: Acetaminophen, Atropine, Barbiturates, Benzodiazepines, Bethanechol, Bromocriptine, Butyropherones, Chloral hydrate, Clonidine, Cyclic antidepressants, Glutethimide, Lithium, Morphine, Nicotinic acid, Organophosphates, Phenformin, Phenothiazines, Reserpine and Tetrahydrocannabinol. Physicians are encouraged to inform patients regarding medications that affect body heat.

Increased awareness is the most effective way to prevent and treat hypothermia. Doctors, nurses and health professionals—including those working in emergency rooms—must remember to check for hypothermia.

Hypothermia became reportable by law in Missouri effective April 8, 1993. The Department of Health routinely maintains surveillance on hypothermia by asking local health departments to rapidly forward information on cases to the state level where they can be compiled weekly or more often in times of extreme cold. Physicians are urged to report cases of hypothermia promptly to their lcoal health departments.

Remember these important facts:

- Hypothermia is a drop in body temperature to below 95°F (35°C).
- Older people are at risk of hypothermia not only in cold weather, but in mildly cool temperatures as well.
- Hypothermia affects older people more often than younger people.
- Alcoholic drinks, certain illnesses and some medications can affect the body's ability to regulate temperature.
- A person suffering from hypothermia is often confused, sleepy or can have slurred speech.
- Hypothermia is dangerous and requires immediate medical care.

Tuberculosis Awareness Fortnight

Each year the American Lung Associations of Eastern and Western Missouri, along with the Missouri Department of Health, Bureau of Tuberculosis Control, co-sponsor Tuberculosis Awareness Fortnight. This upcoming event is scheduled to take place March 10–23, 1996.

Further information on planned activities will be published in the next issue of the *Missouri Epidemiologist*.

If you have questions or want to obtain literature on tuberculosis, please contact:

American Lung Associations
of Eastern and Western Missouri
(800) LUNG-USA
or
Bureau of Tuberculosis Control
(573) 751-6122

Nuclear Power Plants

(continued from page 5)
is also the responsibility of the Department of Health to provide advice to the Governor through the State Emergency Management Agency (SEMA) and to local Emergency Operation Centers concerning decisions affecting protective responses.

In the event of a radioactive release to the environment, Bureau of Environmental Epidemiology personnel will perform assessments of radiological aspects of the incident including trend plotting, analysis and evaluation of data for purposes of radiation protection. Initial assessment will consist of evaluation of information and dose projections provided by the facility. Subsequent assessment will include evaluation of that information as well as data from field monitoring, and available dosimetry data, changes in meteorological conditions and any additional or revised data from the facility. The need for implementing protective actions will be determined by population dose projections.

Annual exercises and drills are performed at each plant as refresher training for emergency workers. Bureau of Environmental Epidemiology staff are involved in each of these exercises. A federally evaluated exercise was held on October 18 at the Callaway Nuclear Power Plant. Participants were graded by federal evaluators on performance and their ability to function under simulated emergency conditions. These exercises are a very important part of maintaining an adequate response capability.

While the chance of an incident occurring at either plant is remote, Bureau of Environmental Epidemiology staff are constantly working to improve their ability to adequately protect the public health and safety of the approximately 800,000 people in Missouri who may potentially be affected by an accident or incident at nuclear power plants.

If you have questions about emergency preparedness and planning as it relates to nuclear power plants in Missouri, please contact the Bureau of Environmental Epidemiology at (573) 751-6102.

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The Managing Editor is H. Denny Donnell, Jr., MD, MPH, State Epidemiologist, assisted by Bill Schmidt, MPH, Director, and Mahree Skala, MA, Deputy Director, of the Division of Environmental Health and Epidemiology. Diane C. Rackers is the Production Manager. Questions or comments should be directed to (573) 751-6128 or toll free (800) 392-0272

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health, Division of Environmental Health and Epidemiology, P.O. Box 570, Jefferson City, MO 65102, (573) 751-6128. TDD users can access the preceding phone number by calling (800) 735-2966.

This newsletter can be recycled.

Health Requirements for International Travel

The Centers for Disease Control and Prevention (CDC) offers two publications on the health recommendations and requirements for international travel.

Health Information for International Travel offers specific recommendations for vaccination and disease prophylaxis including malaria, geographical distribution of potential health hazards and health hints for travelers. This 200-page, annual publication is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202)512-1800. It is also available at the U.S. Government Bookstore, Bannister Mall, Kansas City MO, 64137, (816) 765-2256 for $14. The stock number is 017-023-00195-7. The most recent edition was printed August 1995.

Since it is impossible for an annual publication on international travel to remain absolutely current, CDC offers a useful bi-weekly publication which can be used in conjunction with the above book. The "Summary of Health Information for International Travel," also known as the "Blue Sheet," which lists areas infected with cholera, yellow fever and plague. Subscriptions to the Blue Sheet are available to health departments, physicians, travel agencies, international airlines, shipping companies, travel clinics and other private and public agencies that advise international travelers concerning health risks they may encounter when visiting other countries. The Blue Sheet is available by dialing CDC's fax information service at (404) 332-4565.

Information from these publications or CDC memoranda may also be obtained by calling the Bureau of Immunization at (573) 751 6133.

A final resource is CDC's telephone hotline for international travel, which is (404) 332-4559. This line offers information by voice recording as well as fax.

Vaccines and International Travel

An opportunity will be available in 1996 to enhance your knowledge of the prevention of cholera, yellow fever, Japanese encephalitis, typhoid and other diseases of importance to world travelers. The Centers for Disease Control and Prevention (CDC) will be offering the satellite video conference, Vaccines and International Travel, Friday, March 8, 1996, 11:00–2:30 p.m. CST. For more information about the video conference, or for site locations, contact your immunization representative located in each of the district offices or the Bureau of Immunization at (573) 751-6133.